

### 12/17 Pre-class

- Observe your Bottle Biome and collect your data
- This is still going to count for 15% of your 2<sup>nd</sup> Marking Period grade, so make improvements/revisions if it died or is not sealed.

### Update

- We will have a test next week on Chapter 4
  - We need to keep moving before break
  - Basically 4 months until the AP test
- For HW, read Ch 4 sections 1-3 and be prepared for a quiz on Monday (these will come from the Section Review & Critical Thinking questions on p. 98)

## Biodiversity and Evolution

### Chapter 4

### Core Case Study: Why Should We Care about the American Alligator?

- Largest reptile in North America
- 1930s: Hunters and poachers
- Importance of gator holes and nesting mounds
- 1967: endangered species
- 1977: comeback, threatened species

### The American Alligator



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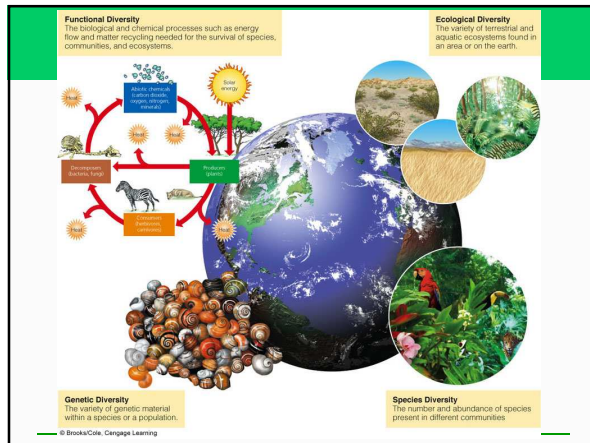
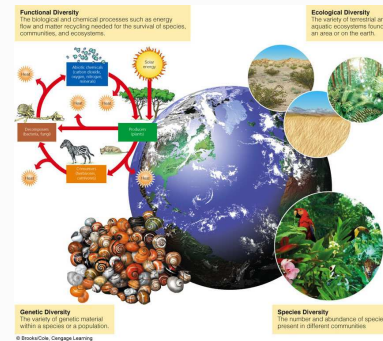
### 4-1 What Is Biodiversity and Why Is It Important?

- **Concept 4-1** The biodiversity found in genes, species, ecosystems, and ecosystem processes is vital to sustaining life on earth.
- **Biodiversity:** the variety of Earth's species, the genes they contain, the ecosystems in which they live, and the ecosystem processes such as energy flow and nutrient cycling that sustain all life.

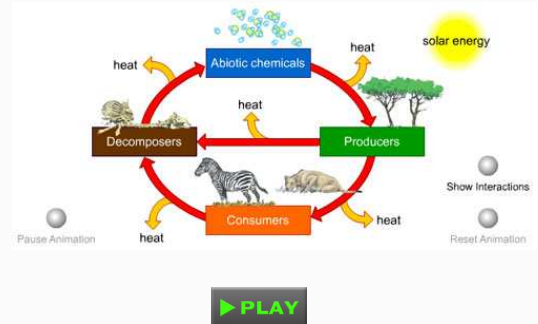
## Biodiversity Is a Crucial Part of the Earth's Natural Capital

- **Vital renewable resource**
- **Species diversity**
- **Genetic diversity**
- **Ecosystem diversity**
- **Functional diversity: the variety of biological and chemical processes (E flow, nutrient cycling) that occur in ecosystems.**

## Natural Capital: Major Components of the Earth's Biodiversity



## Functional Diversity: Matter recycling and energy flow



## Video: Frogs galore



## 4-2 Where Do Species Come From?

- **Concept 4-2A** *The scientific theory of evolution explains how life on earth changes over time through changes in the genes of populations.*
- **Concept 4-2B** *Populations evolve when genes mutate and give some individuals genetic traits that enhance their abilities to survive and to produce offspring with these traits (natural selection).*

## Biological Evolution by Natural Selection Explains How Life Changes over Time

- Biological evolution
- Natural selection
  - Charles Darwin
  - Alfred Russel Wallace
- Tree of Life

## Six Major Kingdoms of Species as a Result of Natural Selection

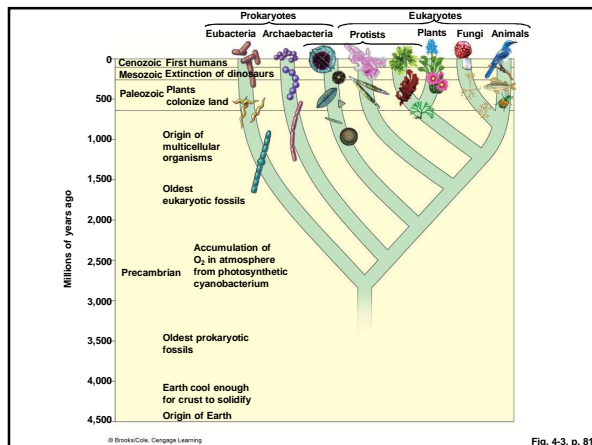
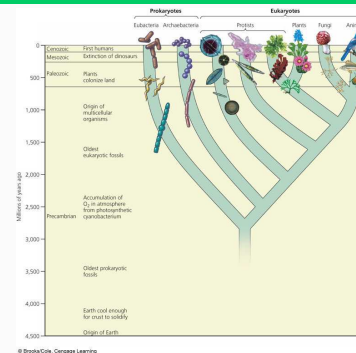


Fig. 4-3, p. 81

## The Fossil Record Tells Much of the Story of Evolution

- Fossils
  - Physical evidence of ancient organisms
  - Reveal what their internal structures looked like
- Fossil record is incomplete: why?

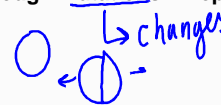
## Fossilized Skeleton of an Herbivore that Lived during the Cenozoic Era



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## The Genetic Makeup of a Population Can Change

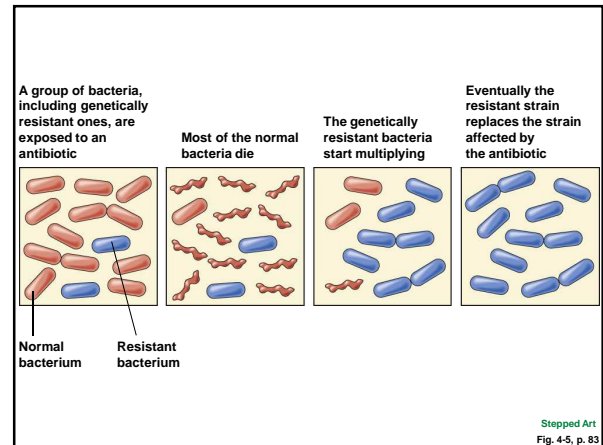
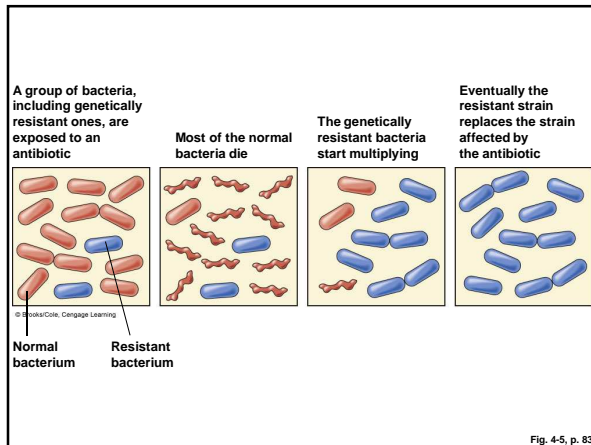
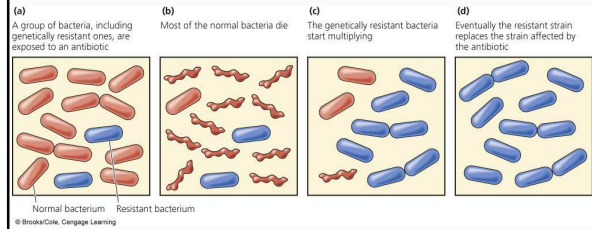
- Populations evolve by becoming genetically different
  - ↳ not individuals
- Genetic variations
  - First step in biological evolution
  - Occurs through mutations in reproductive cells



## Beneficial Genetic Traits Can Leave More Offspring

- **Natural selection: acts on individuals**
  - Second step in biological evolution
  - Adaptation may lead to **differential reproduction**
  - Genetic resistance - antibiotics!!!
- **When environmental conditions change, populations**
  - Adapt - change behavior/genes
  - Migrate - move
  - Become extinct - die

## Evolution by Natural Selection



## Case Study: How Did Humans Become Such a Powerful Species?

- **Three human adaptations**
  - Strong opposable thumbs
  - Walk upright
  - Complex brain

## Adaptation through Natural Selection Has Limits

- **Genetic change must precede (happen BEFORE) change in the environmental conditions**
- **Reproductive capacity**



### Three Common Myths about Evolution through Natural Selection

- “Survival of the fittest” is not “survival of the strongest”
  - WHY? ↳ well-suited to environment
- Organisms do not develop traits out of need or want
  - Changes: in populations, not individuals
- No grand plan of nature for perfect adaptation
  - “Intelligent Design” is not testable and therefore not scientifically valid

### Animation: Adaptive trait



▶ PLAY

### Exit Ticket

Name: \_\_\_\_\_

1. Give 2 specific examples of biodiversity.
2. Why isn't Intelligent Design scientifically valid?
3. How do we know that life has changed over geologic time?